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(12) **EUROPEAN PATENT APPLICATION**

(54) Television receiver comprising a teletext decoding circuit and a page number memory.

(57) A television receiver which is suitable for displaying teletext pages comprises a control system including a microcomputer. This microcomputer is coupled to a volatile memory which comprises a plurality of page number registers. A page number can be stored temporarily in each of these registers. With the aid of a keyboard the user makes known which page numbers he wants to have stored in the different registers and the stored page numbers represent a first series of pages.

One single read key (RCL) is provided for the display of such a page. Each time this key is depressed once, a different page belonging to the first series appears on the picture screen. The sequence in which the pages appear is the same as the sequence in which the user has keyed-in the relevant page numbers. This sequence can be interrupted by the occurrence of a preselected operating instruction in response to which a number of teletext pages not associated with said first series can be displayed on the picture screen. Thereafter, the display of the teletext pages of the first series can be continued.
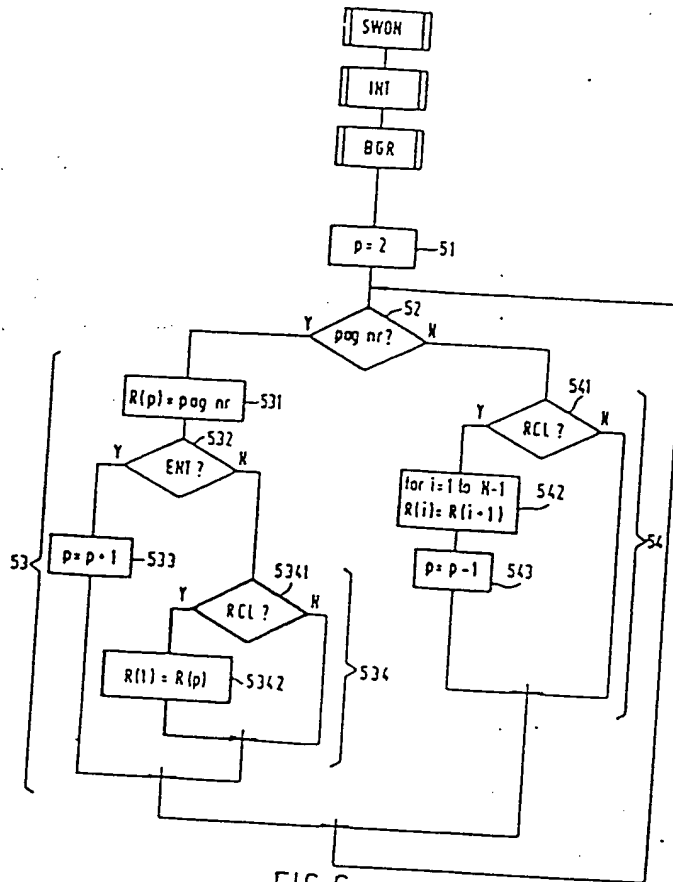
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FIG.6

"Television receiver comprising a teletext decoding cir-
cuit and a page number memory."

A. Background of the invention.
A(1) Field of the invention.
   The invention relates to a television receiver
of a type comprising a teletext decoder circuit and a
5 storage means (page number memory) in which the page num-
bers associated with a plurality of teltext pages can be
stored.
A(2) Description of the prior art.
   Such a television receiver has (several operating
10 mode, more specifically) at least a program mode and a
teletext mode. In the program mode, the video signal
transmitted by a transmitter is applied through a video
channel to a picture screen for displaying the television
program. In the teletext mode said video signal is applied
15 via a teletext decoder circuit to the picture screen for
displaying the teletext multiplexed with the program. The
television program can be partly or wholly suppressed.
   The operating mode is determined by the viewer,
(user). To enable the viewer to inform the receiver about
20 his wishes, the receiver comprises a control system com-
prising external components which can be manipulated by
the viewer. More specifically, this control system has a
control panel with control keys, each having a specific
control function. The function is indicated by a sign
25 applied on, over, or under the relevant control key. Thus,
there are for example a volume control key a luminance
key, a teletext key, a mixed-mode key, a program key and
a plurality of figure keys, etc. These last-mentioned keys
are characterized in that the associated signs are figures.
30 If the receiver is in the program mode, the viewer can
inform the receiver with the aid of the figure keys which
program or channel is wanted. After the teletext or the
mixed-mode key has been operated the set is in the teletext

mode with a partly or wholly suppressed television program
and the viewer keys-in the page number of the desired
teletext page, using the same above-mentioned figure keys.

Operation (or manipulation) of one or more
5   of the keys on the control panel generally results in the
generation of a control instruction by the control system.
Such control instruction may include the page numbers of
desired teletext pages. All these instructions are received
by a control circuit which interprets these instructions
10 and gives instructions to the different circuits, inter
alia the teletext decoder circuit to be controlled. More
specifically, the teletext decoder circuit receives a
page number in response to which the required teletext
page is captured, stored in a page memory and thereafter
15 displayed on the picture screen.

As is known, a teletext index page is first
displayed on the picture screen after a teletext key or
the mixed-mode key has been operated. By selecting a
desired page from this index and keying-in the associated
20 page number with the aid of the figure keys, this tele-
text page is captured by the teletext decoder circuit and
displayed thereafter.

If thereafter the display is required of a page
associated with a different subject, the index page must
25 usually again be consulted to find the page number of
the relevant page. It should be borne in mind that each
time the page number of a desired page is keyed-in it
takes a certain period of time before the relevant page
is displayed on the screen; it is therefore justified to
30 state that such a television receiver is far from user-
friendly. To improve this, it is proposed on page 527
of reference 1 to provide the receiver with a storage
means which is coupled to the control circuit and in
which a plurality of page numbers can be stored. This
35 storage means will be referred to as the page number memory
hereinafter.

By operating the control circuit, the user can
store a first series of page numbers in a sequence in

which he wants their pages to be displayed, in the page
number memory. To enable the display in the desired sequence
of these preselected teletext pages, the control panel
comprises a key which will be called the read key herein-

5 after. Each time this key is operated, the control circuit
receives an accurately defined operating instruction and
a subsequent page number of the first series is read from
the page number memory and applied to the teletext decoder
circuit. In this way the teletext pages of the first series

10 are sequentially displayed on the picture screen.

Thus, for this television receiver it is possible
to select from an index page all those pages the viewer
is interested in. The corresponding page numbers can be
stored in the page number memory in the sequence in which

15 the display of these pages is desired. Thereafter, they
can be caused to appear in the desired sequence, one after
the other, by pushing the read key once for every page.

It should be noted, that, after the read key
has been operated, it still takes a certain time before

20 the new page appears on the picture screen. However, by
constructing the teletext decoder circuit in the way
described in Reference 1 or 2, a new page can be displayed
immediately after pushing the read key. More specifically
it is namely possible to couple to the teletext decoder

25 circuit detailed in said references a page memory having
such a capacity that no less than four pages can be stored
therein simultaneously. It is organised that this page
memory contains the page actually displayed on the picture
screen and also the three subsequent pages of the first

30 series.

It should also be noted that the page number
memory may be constituted by a non-volatile memory, so
that the same series of teletext pages are permanently
available. It is alternatively possible to use a volatile

35 memory for this purpose, optionally in combination with
a non-volatile page number memory.

B. Object and summary of the invention.

The invention has for its object to further im-

prove the comfort of use of a television receiver of the
type defined in the foregoing, comprising a volatile page
number memory. According to the invention, the control
circuit is further arranged for performing the following
5   steps:

          - interrupting the sequential display of the
teletext pages of the first series for the benefit of the
sequential display of a number of further teletext pages
which do not belong to the first series, whose associated
10   page numbers are generated by means of the control system;
          - continuing the display of the teletext pages
of the first series in response to a further operation
of the read key, after all the further teletext pages
have been displayed on the screen.
15   The properties of the television receiver thus
obtained will no doubt to be appreciated when the following
is considered. The contents of the first series of pages
whose page numbers are stored in the page number memory
are not known previously. When those pages are displayed,
20   it may happen that a given page is itself an index page
(denoted a sub-index page)or that it contains a reference
to pages in which additional information on the same sub-
ject is contained. The viewer can now select from such a
sub-index page a further series of pages, generate the
25   associated page numbers with the aid of the control system
and insert the display of these pages between the sub-index
page and the next page of the first series. If the control
circuit were not implemented in such a way that the above-
defined steps can be performed, then these further pages
30   could not be displayed until all the pages of the first
series have been displayed on the picture screen.
C. References.

1. Enhanced UK teletext moves towards still pictures;
J.P.Chambers: IEEE Transactions on Consumer Electronics,
35   Vol. CE-26, August 1980, pages 527-532.
2. Computer controlled teletext; J.R.Kinghorn; Electronic
Components and Applications, Vol. 6, No. 1, 1984, pages
15-29.

3. Bipolar IC's for video equipment; Philips Data Handbook
Integrated Circuits Part 2, January 1983.

4. IC's for digital systems in radio, audio and video
equipment; Philips Data Handbook Integrated Circuits, Part
3, September 1982.

D. Short description of the Figures:

　　　　Fig. 1 shows the general structure of a tele-
vision receiver comprising a teletext decoder circuit and

　　　　Figs. 2 to 10 show diagrams to explain the
operation of this television receiver.

E. Description of embodiments:

E(1) General structure of the television receiver.

　　　　Fig. 1 shows schematically the general structure
of a colour television receiver. It has an aerial input 1,
connected to an aerial 2, which receives a video signal
modulated on a high-frequency carrier and processed in a
plurality of processing circuits. More specifically, the
video signal is applied to a tuning circuit 3 (tuner or
channel selector). This tuning circuit receives a band
selection voltage V_B to enable tuning of the receiver to
a frequency within one of the frequency bands VHF1, VHF2,
UHF etc. In addition, the tuning circuit receives a tuning
voltage V_T for tuning the receiver to the desired fre-
quency within the selected frequency band.

　　　　This tuning circuit 3 produces an oscillator
signal having frequency f_{OSC} and also an intermediate-
frequency signal IF. The last-mentioned signal is applied
to an intermediate-frequency amplifying and demodulating
circuit 4 which produces a base band composite video sig-
nal CVBS. For this circuit 4, reference could be made
to Philips IC TDA 2540, described in Reference 3.

　　　　The signal CVBS thus obtained is applied to a
colour decoder circuit 5, which produces the three primary
colour signals R, G and B, which are applied via an ampli-
fier circuit 6 to a picture tube 7 for displaying tele-
vision programs on the picture screen 8. In the colour
decoder circuit 5, inter alia colour saturation, contrast
and luminance are influenced by means of control signals.

In addition, the colour decoder circuit receives an additional set of primary colour signals R', G' and B', and also a switching signal BLK (Blanking) with which the primary colour signal R, G and B can be suppressed. For this circuit 5, a Philips integrated circuit of the group TDA 356 X, which is also described in Reference 3, can be used.

The video signal CVBS is also applied to a teletext decoder circuit 9, which comprises a video input processor 9(1) receiving the video signal CVBS, separating the teletext data therefrom and applying the latter _via_ a data line TTD to a circuit 9(2) which will be called the computer-controlled teletext decoder (abbreviated to CCT-decoder). This CCT-decoder also receives a clock signal from the video input processor 9(1) _via_ a clock line TTC. The decoder is further coupled to a memory 9(3) in which one or more teletext pages can be stored and which is therefore called the page memory. This CCT-decoder produces the three previously-mentioned primary signal R', G', B' and also the switching signal BLK. The video input processor 9(1) may be constituted by the Philips IC SAA 5230, the CCT-decoder 9(2) by the Philips IC SAA 5240 and the page memory by a 1K8 to 8K8 RAM. For a detailed description of the structure and operation of a teletext decoder circuit reference is made, for the sake of brevity, to Reference 2.

The CCT-decoder 9(2) is further connected to a bus system 10, to which also a control circuit 11, in the form of a microcomputer, an interface circuit 12, a non-volatile storage means 13 and a volatile storage means 14 are connected. The interface circuit 12 produces said band selection voltage V_B, the tuning voltage V_T and also the control signals for controlling the analog functions of contrast, luminance and colour saturation. It receives an oscillator signal having frequency f'_{OSC} which by means of a frequency divider 15 whose dividing factor is 256, is derived from the oscillator signal having frequency f_{OSC} supplied by the tuning circuit 3. Tuning circuit 3,

frequency divider 15 and interface circuit 12 together form
a frequency synthesizing circuit. The Philips IC SAB 3035,
which is known by the name CITAC (Computer Interface for
Tuning and Analog Control) and is described in Reference
5 4 may be used as the interface circuit.

The storage means 13 is, for example, used to
store the tuning data of a plurality of preselected trans-
mitters, or programs. If under the control of the micro-
computer 11 such a tuning datum is applied to the inter-
10 face circuit 12, then it produces a given band selection
voltage V_B and a given tuning voltage V_T, in response to
which the receiver is tuned to the desired transmitter.

For the microcomputer the microcomputer of the
Philips MAB 84XX family can be used. Although it may be
15 assumed that the structure of a microcomputer is generally
known, it should here be remarked briefly that it comprises
a program memory (usually a ROM) in which the manufacturer
stores a plurality of control programs, and also a working
memory.

20 The volatile storage means 14 is used as a page
number memory. It comprises a number of N page number-
registers having the register numbers $R(1)$, $R(2)$, .. $R(p)$
... $R(N)$, respectively, wheren $N = 10$. This volatile
storage means 14 which is shown in the drawing as a se-
25 parate memory, is preferably constituted by a portion of
the working memory of the microcomputer 11.

To operate this television receiver a control
system is provided which in the embodiment shown is in
the form of a remote control system and is constituted by
30 a handset 16 and a local receiver 17. This receiver 17 has
an output which is connected to an input (usually the
"interrupt"-input) of the microcomputer. The receiver
may be the Philips IC TDB 2033 described in Reference 4
and then has for its object to receive infrared signals
35 transmitted by the handset 16.

The handset 16 comprises a control panel 16(1)
which, in addition to a number of figure keys indicated
by the figures 0 to 9, has the following keys: a saturation

key SAT, a brightness key BRI, a volume control key VOL,
a teletext key TXT, a mixed-mode key MIX, a program key PR,
a storage key ENT and a read key RCL. The keys of this
control panel are coupled to a transmitter circuit 16 (2)
5   for which the Philips IC SAA 3004, which is described in
detail in Reference 4, may, for example, be used. If a key
is depressed, then the transmitter circuit 16(2) generates
a code which is specific for that key and which is trans-
mitted on an infrared carrier to the local receiver 17,
10   is demodulated there and thereafter applied to the micro-
computer 11. Thus, the microcomputer receives control in-
structions and _via_ the bus system 10 energizes one of the
circuits coupled thereto. It should be noted that a control
instruction may be single, that is to say that it is com-
15   plete after only one single key has been operated. It may
alternatively be a multiple instruction, that is to say
that it is not complete until two or more keys have been
operated. This situation occurs, for example, when the
receiver is in the teletext mode. In that case operating
20   the figure keys does not produce a complete operating in-
struction until, for example, three figure keys have been
depressed. Such an operating instruction, consisting of for
example three figures, is called a page number.

E(2) Operation of the television receiver.

25   The operation of the television receiver shown
in Figure 1 is wholly determined by the various control
programs stored in the internal program memory of the
microcomputer. A control program which is always stored
in such a receiver, is the switch-on program SWON which
30   is shown symbolically in Fig. 2. Although this program is
generally known, it should be noted for the sake of com-
pleteness that this program immediately applies a pre-
determined tuning datum present in the storage means 13
to the circuit 12 after the receiver has been switched on,
35   in response to which the receiver is tuned to the relevant
transmitter. This may be a predetermined transmitter, but
it may also be a transmitter the receiver was tuned to at
the moment it was switched off.

After the switch-on program has beenperformed,
the initiation program INT which is symbolically indicated
in Fig. 3 is started. During this program the content of
the first page number - register R(1) is made equal to
5 a fixed page number; for example 100 (one hundred). This
page number 100 is also applied to the CCT-decoder 9(2)
which captures this page, stores it in the page memory
9 and displays it on the picture screen 8 after the tele-
text key TXT or the mixed-mode key MIX has been operated.
10 To determine whether a key has been depressed, the so-
called background program BGR, which is shown symbolically
in Fig. 4 is started.

After the teletext key or the mixed-mode key
has been operated, a teletext program is started which is
15 given the reference numeral 50 in Fig. 5. This program
includes a step 51 in which the value 2 is assigned to a
vector e. Thereafter, in a step 52 it is checked whether
a page number is received. If yes, then a storage program
53 is passed through; or, if no, a read program 54 is
20 entered. After such a program has ended, it is checked in
step 53 whether a new page number is received.

The storage program 53 includes a step 351 in
which the page number received is stored in the register
R(p). Thereafter, in a step 532 it is checked whether
25 the storage key (enter key) ENT has been operated. If not,
then this storage program has ended and the content of the
register R(p) can be overwritten by a different page num-
ber. If the enter key has been operated, the vector p is
first incremented by one in a step 533. Acting thus,
30 the registers R(1) to R(N) can be loaded with page numbers
of a first series of teletext pages. These pages can now
be displayed sequentially on the picture screen by means
of the read program upon operating the read key RCL. More
specifically, the read program 54 has a step 541 in which
35 it is checked whether the read key has been operated. If
no the read program has ended; if yes, the contents of
the registers are shifted in a step 542 to registers of
the next lower number, that is to say the content of regis-

ter R(2) is shifted to R(1), the content of register R(3)
is shifted to R(2) etc. Thereafter, the vector p is de-
cremented by one unit in a step 543, so this vector p
now indicates the empty register having the lowest number.
5   If now a new page number were received and the storage
key ENT were depressed, then this new page number would
be stored in the register R(p-1). Before the associated
teletext page can be displayed, the read key RCL must then
first be depressed p-2 times. Pre-storing the page numbers
.0 of the desired teletext pages and the fact that only one
key (namely the read key) must be operated to effect the
display of these pages, makes this television receiver
very user-friendly. However, the fact that a new page num-
ber cannot result in the immediate display of the asso-
15 ciated page when all the page number registers are not
empty (so that the vector p = 1) is experienced as annoying.
To increase the convenience and comfort of use of this
television receiver the storage program is provided, as is
shown in Fig. 6, with an auxiliary read program 534 con-
20 sisting of one step 5341 in which it is checked if after
reception of a page number the read key RCL has been
operated without the storage key ENThaving been depressed.
If this is the case, then in a step 5342 the content of
register R(p) is transferred to register R(1) and thus the
25 relevant page is captured and displayed as soon as the
opportunity is there.

        With the program shown in Fig. 6 a subsequent
new page number can be applied after the preceding new
page number has been transferred from register R(p)to
30 register R(1). A storage and read program with which the
successive display of the teletext pages of the first
series can be interrupted to enable the storage of a second
series of page numbers in a sequence the user wants their
to be displayed and the sequential display of the pages
35 of this second series in response to the depression of
the read key RCL, followed by the display of the original
(first) series of pages, is illustrated in Fig. 7. This
program differs from the program shown in Fig. 5 in that

now the read program 54 has, instead of the program step
543, a program step 543' in which the vector $\underline{p}$ is made
equal to two. After each operation of the read key RCL
and the register contents have been shifted one register
in step 542, this vector becomes equal to two.

The storage program 53 further comprises a step
535 in which the contents of the register $R(p)$ to $R(N-1)$
are shifted to registers of a next higher number.

If, after the read key RCL has been depressed
and the read program has been performed a new page number
is applied to the microcomputer, then in step 535 the
content of the second register $R(2)$ is shifted to the
third register $R(3)$, the content of the third register
$R(3)$ is shifted to the fourth register $R(4)$ etc. There-
after, the new page number is stored in the second regis-
ter $R(2)$ in step 531. If thereafter the storage key ENT
is operated, then the vector $\underline{p}$ becomes equal to 3. A new
page number is then stored in the third register $R(3)$,
whilst the original content of the third, fourth, fifth,
sixth, etc. registers are shifted to the fourth, fifth,
sixth, seventh etc. registers, respectively. In this way,
each of a second series of Q-1 page numbers can be stored
in the registers $R(2)$ to $R(Q)$ each time the read key RCL
is operated, the page numbers originally contained in
these registers being shifted to registers of Q-1 higher
numbers. When the read key is now operated, these Q-1
page numbers of the second series are first applied to
the teletext decoding circuit to capture their respective
pages for display and only thereafter the display of the
pages of the original (first) series of page number is
continued.

The program shown in Fig. 6, which provides the
possibility of storing a new page number directly in the
first register, and thus to display the associated page
on the display screen at the first opportunity, can ad-
vantageously be combined with the program shown in Fig.
7. For the sake of completeness, Fig. 8 shows a program
comprising both the program steps shown in Fig. 6 and those

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shown in Fig. 7. To have this program proceed adequately, the steps 5343, 5344 are additionally present which, in view of the foregoing need no further explanation.

The teletext programs shown in Figs. 5, 6, 7 and 8 are structured such that storing a series of new page numbers requires the operation of the storage key ENT after a new page number has been applied. It is however alternatively possible to structure the teletext program such that the storage key must be operated before a new page number is applied. Such a teletext program is shown for the sake of completeness in Fig. 9. It comprises a step 51' in which the vector p is given the value one. To enable, in agreement with the program shown in Fig. 6, the immediate storage of any random page number in the register R(1), this program has a step 60 in which it is checked whether a page number is applied. If yes, this page number is immediately stored in the first register R(1) in step 61, whereafter early display of the relevant page can follow. If no page number is applied, then it is checked in step 62 whether the storage key ENT has been operated. If no, the read program 54 is effected: if yes, the storage program 63 is effected.

The read program again includes the steps 541 and 542. It now also has a step 543" in which the vector p is again made equal to one. The storage program 63 has a step 631 in which the actual value of the vector is incremented by one. Thereafter, in a step 632, the application of a new page number is awaited, whereafter in step 633 the contents of the registers R(p) to R(N-1), respectively are shifted to the registers R(p+1) to R(N). Finally, in step 634 the latest page number is stored in the register R(p).

The teletext programs mentioned in the foregoing have the property that those page number registers R(.) in which no page numbers selected by the user are stored remain empty. This implies that when the user repeatedly depresses the read key he may be confronted by the situation that all registers are empty. To prevent this situation

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from occurring, these registers may be filled automatically
with page numbers, for which there are two adequate possi-
bilities. Firstly, they might be the page numbers of pre-
ferred pages which had previously already been stored by
5   the user in a non-volatile memory, for example, the memory
13 in Fig. 1. Secondly, they might be the page numbers
S+1, S+2, ... etc., S being the last page number of the
first series. To accomplish that the page number registers
are filled thus with page numbers, the teletext program
10 might be of a structure as shown in Fig. 10. This program
corresponds to a considerable extent to the program shown
in Fig. 8, but differs therefrom in several respects. Step
51 is followed by a step 70 in which a page number and also
a user flag flg(.) are stored in the registers R(2) to
15 R(N) (see Fig. 1). More specifically, the page number in
the register R(i) then becomes one higher than the page
number in the preceding register R(i-1), so that at the
end of this step 70 the page number registers R(1) to R(n)
contain the respective page numbers 100, 101, 102, 103, ...
20 100 + (N-1). The associated user flags are all zero.

       If at a given value of the vector $\underline{p}$ a new page
number, for example S, is applied, then in step 71 it is
first checked whether the user flag flg(p) in the register
R(p) is equal to one. If no, this implies that the regis-
25 ter R(p) is not filled with a page number explicitly
stipulated by the user. In step 721 this newly applied
page number S is then stored in this register R(p). At
the same time the associated user flag flg(p) becomes 1
to indicate that this page number has been selected by
30 the user. Thereafter a step 722 is performed which cor-
responds to step 70. More specifically, the page number
S+1 is then stored in the register R(p+1), the page number
S+2 in the register R(p+2) whilst the associated user
flags flg(p+1), flg (p+2), etc. all become equal to zero,
35 signifying that these page numbers were not explicitly
stated by the user.

       If upon performing the step 71, the user flag
flg(p) in the register R(p) is equal to one, then in step

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535 the contents of the registers $R(p)$ to $R(N-1)$ are shifted to the respective registers $R(p+1)$ to $R(N)$, so that in step 531' the latest page number can be stored in the register $R(p)$, the associated user flag $flg(p)$ then simultaneously becoming equal to one.

This teletext program further differs from the program shown in Fig. 8 in that the auxiliary read program 534 has a further step 5345 and the read program 54 has a further step 544 identical thereto. In these steps, each time after the last page number register $R(n)$ has become empty because of the shift operation effected in the preceding step, a page number which is one higher than the page number stored in the last-but-one register $R(N-1)$ is stored in this register $R(N)$. At the same time the associated user flag $flg(N)$ becomes equal to zero.

It should be noted that in the embodiment shown in Fig. 1 the control circuit is predominantly constituted by the microcomputer 11. In practice it has however been found advantageous to arrange between the microcomputer 11 and the CCT-decoder 9(2) a second microcomputer which only controls this CCT-decoder 9(2) and for that purpose comprises _inter alia_ one of the teletext programs described in the foregoing.

CLAIMS

1.   A television receiver comprising:
- a control system for generating by means of external manual operations control instructions including page numbers of teletext pages;
5   - a teletext-decoder circuit having an input for receiving page numbers of teletext pages to be displayed and a picture signal output;
- a picture screen coupled to the picture signal output of the teletext-decoder circuit for displaying a tele-
10 text page which is identified by its page number;
- a storage means for storing a plurality of page numbers;
- a control circuit coupled to the storage means, to the control system for receiving the operating instructions, and to said input of the teletext decoder circuit to
15 apply page numbers thereto, the control circuit further being arranged for performing the following steps:
        - storing in the storage means the page numbers stipulated by the user of a first series of preselected teletext pages in the desired display sequence of these
20 teletext pages;
        - the sequential display of the teletext pages of the first series in response to each occurrence of a selected operating instruction;
        - interrupting the sequential display of the
25 teletext pages of the first series in response to the occurrence of a selected further operating instruction for the benefit of the sequential display of a number of further teletext pages which do not belong to the first series whose associated page numbers have been generated
30 by means of the control system;
        - continuing the display of the teletext pages of the first series after all the further teletext pages have been displayed on the picture screen.

2.   A television receiver as claimed in Claim 1
in which the step of interrupting the sequential display
of the teletext pages of the first series for the benefit
of displaying a number of further teletext pages·not

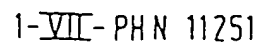5   associated with said series, comprises the following sub-
steps:
          - storing the page numbers of said number of
further teletext pages in the storage means in a desired
display sequence of these teletext pages;

10   - the sequential display of these teletext
pages in response to each occurrence of the selected
operating instruction.
    3.   A television receiver as claimed in Claim 1 or
2, in which the storage means comprises N registers, each

15   arranged for storing a page number, a register in which a
page number selected by the user is stored being occupied
and the remaining registers not being occupied by page
number selected by the user and in which the control
circuit is further arranged for:

20   - not occupying a register in response to each
occurrence of the selected operating instruction;
          - generating a sequence of page numbers S+1,
S+2, S+3, ..., in which S represents the last page number
of the first sequence;

25   - storing the page numbers S+1, S+2, ... S+(N-M)
in the respective non-occupied registers, where M is the
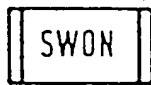actual number of occupied registers.

30

35

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FIG.1

SWON

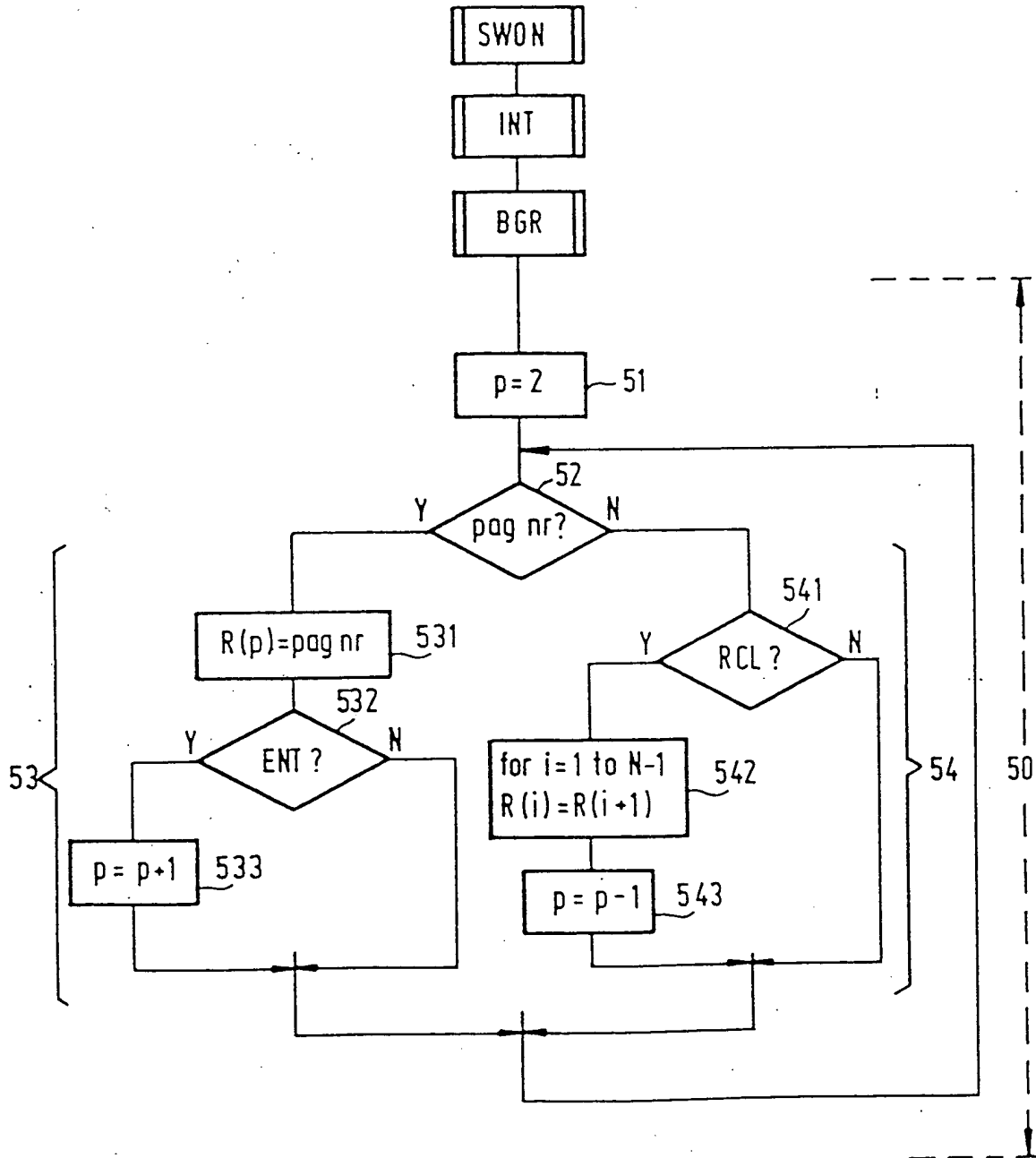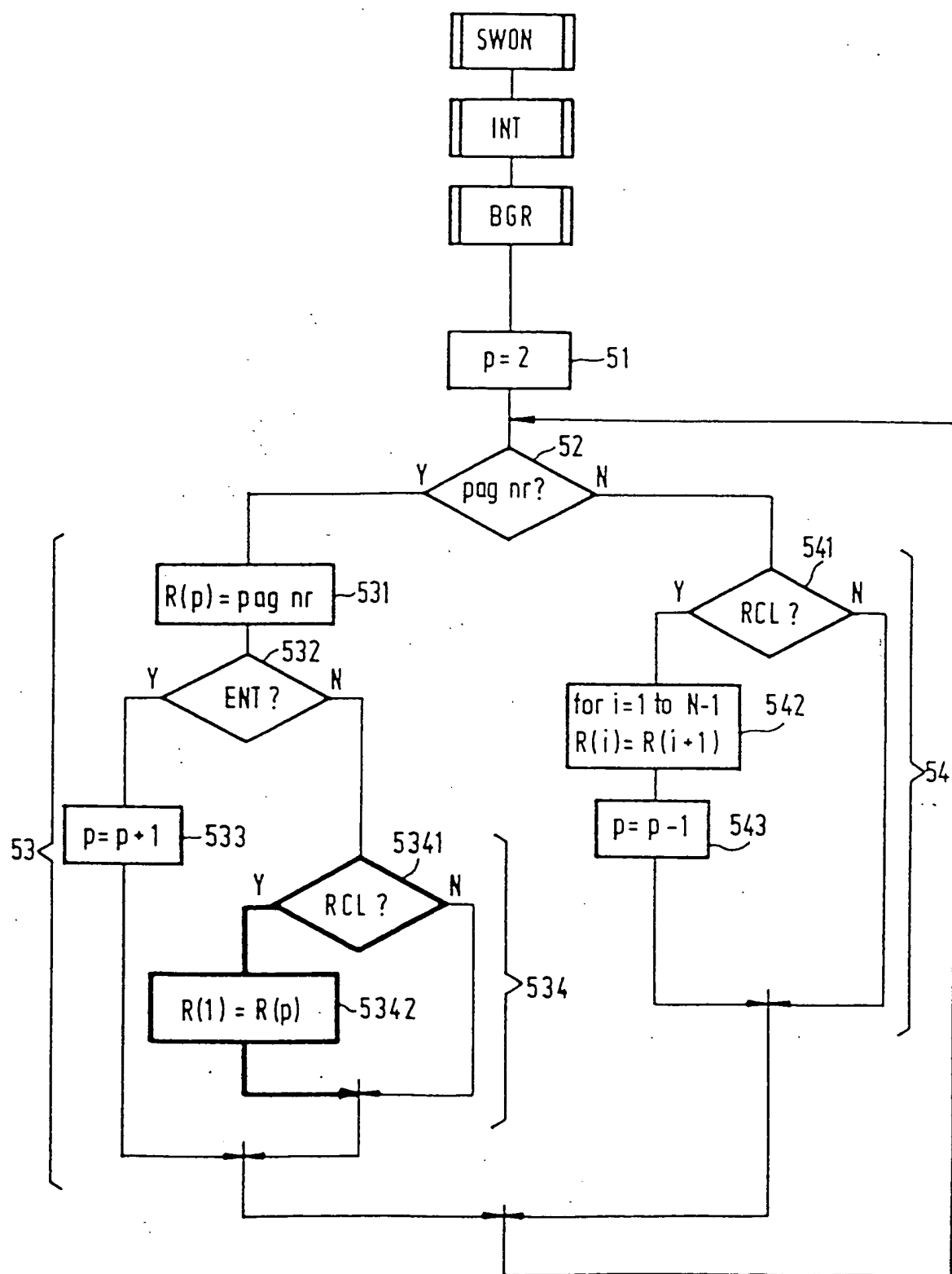FIG.2

(R(1)=100)

INT

FIG.3

BGR

FIG.4

SWON

INT

BGR

p = 2 —51

52

Y   pag nr?   N

R(p)=pag nr —531

532

Y   ENT ?   N

p = p+1 —533

53

541

Y   RCL ?   N

for i=1 to N-1
R(i)=R(i+1) —542

p = p-1 —543

54

50

FIG.5

FIG.6

FIG.7

```
                    ┌─────────┐
                    │  SWON   │
                    └────┬────┘
                    ┌────┴────┐
                    │  INT    │
                    └────┬────┘
                    ┌────┴────┐
                    │  BGR    │
                    └────┬────┘
                    ┌────┴────┐
                    │  p=2    │──── 51
                    └────┬────┘
```
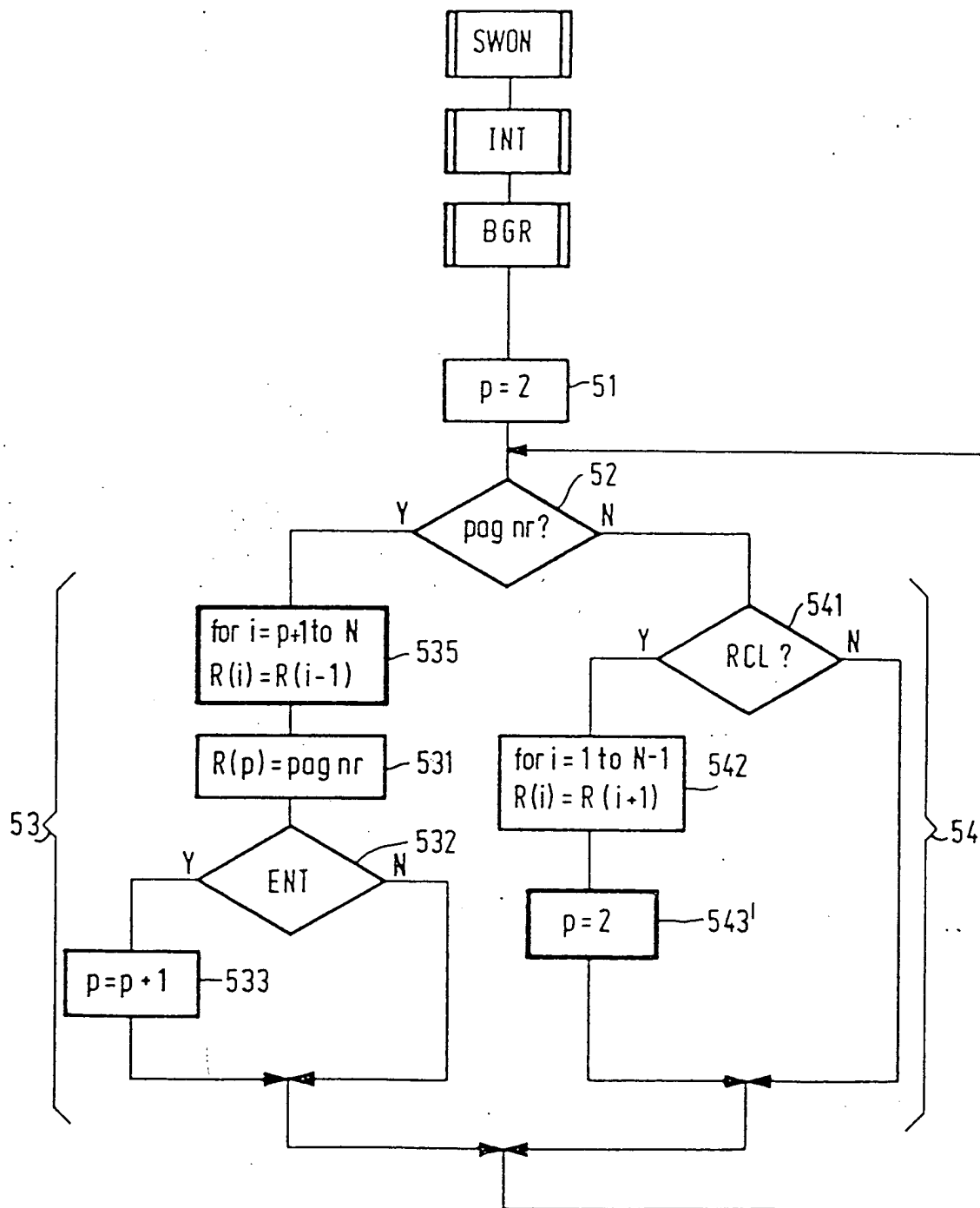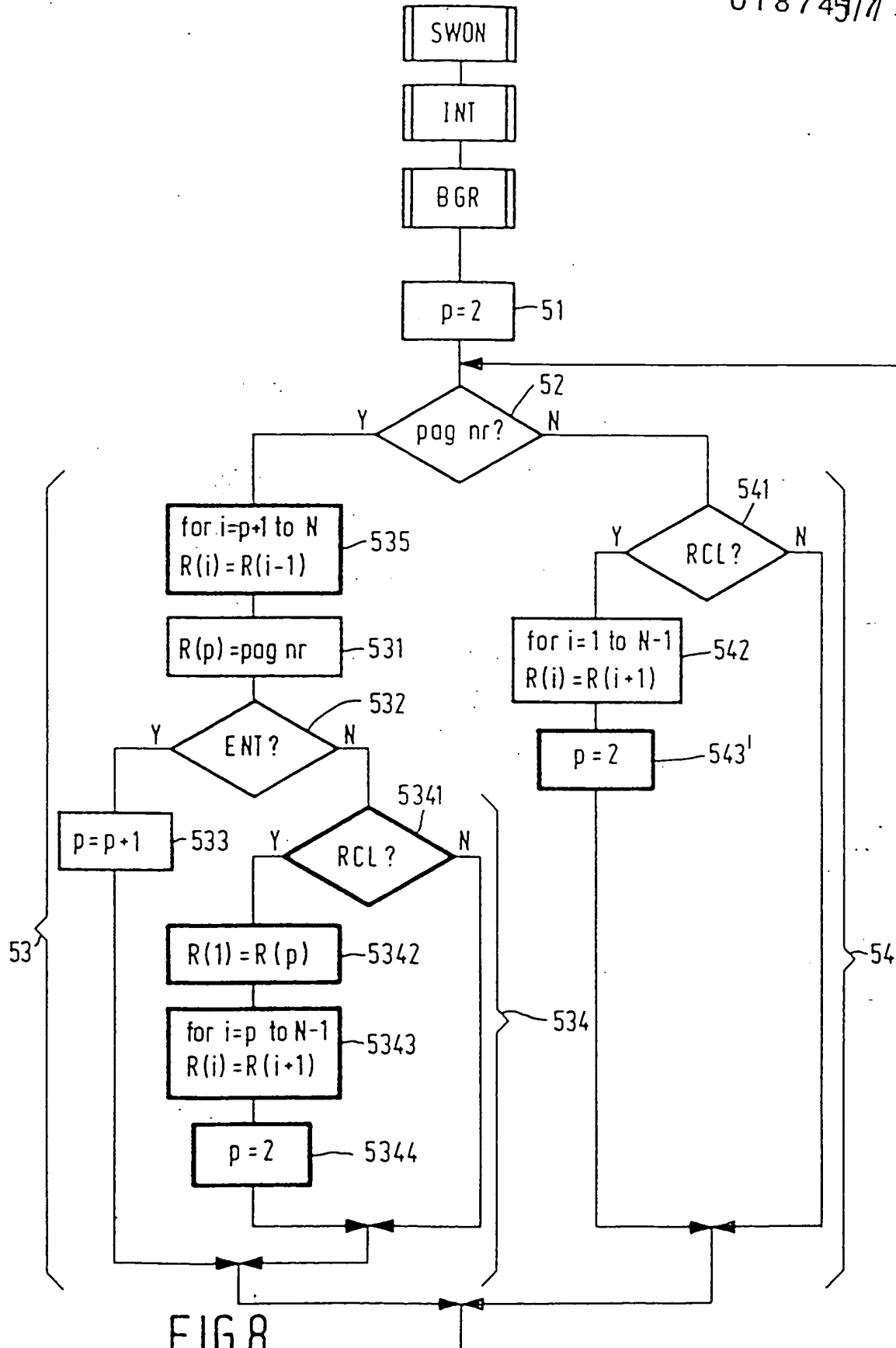
FIG.8
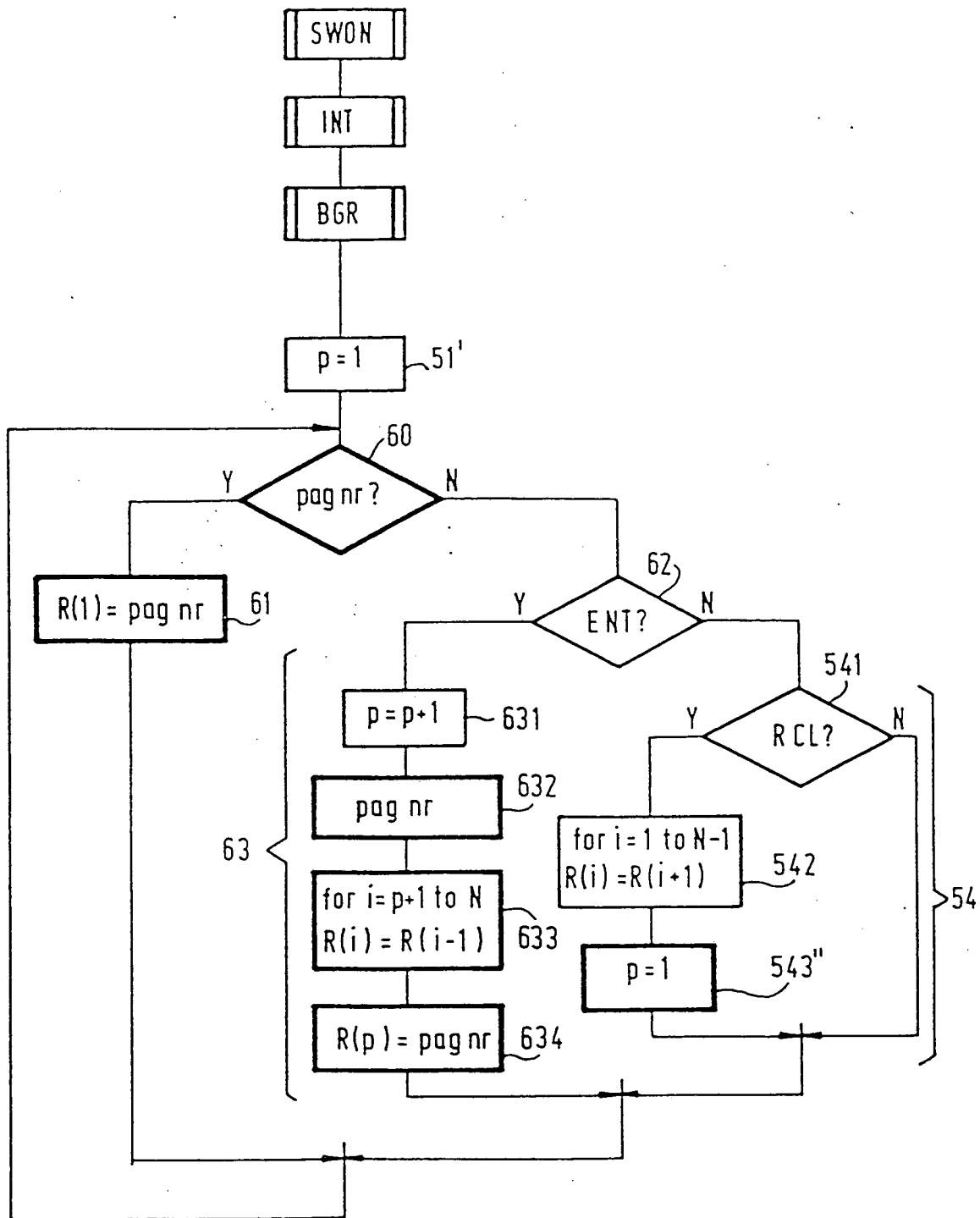
FIG.9
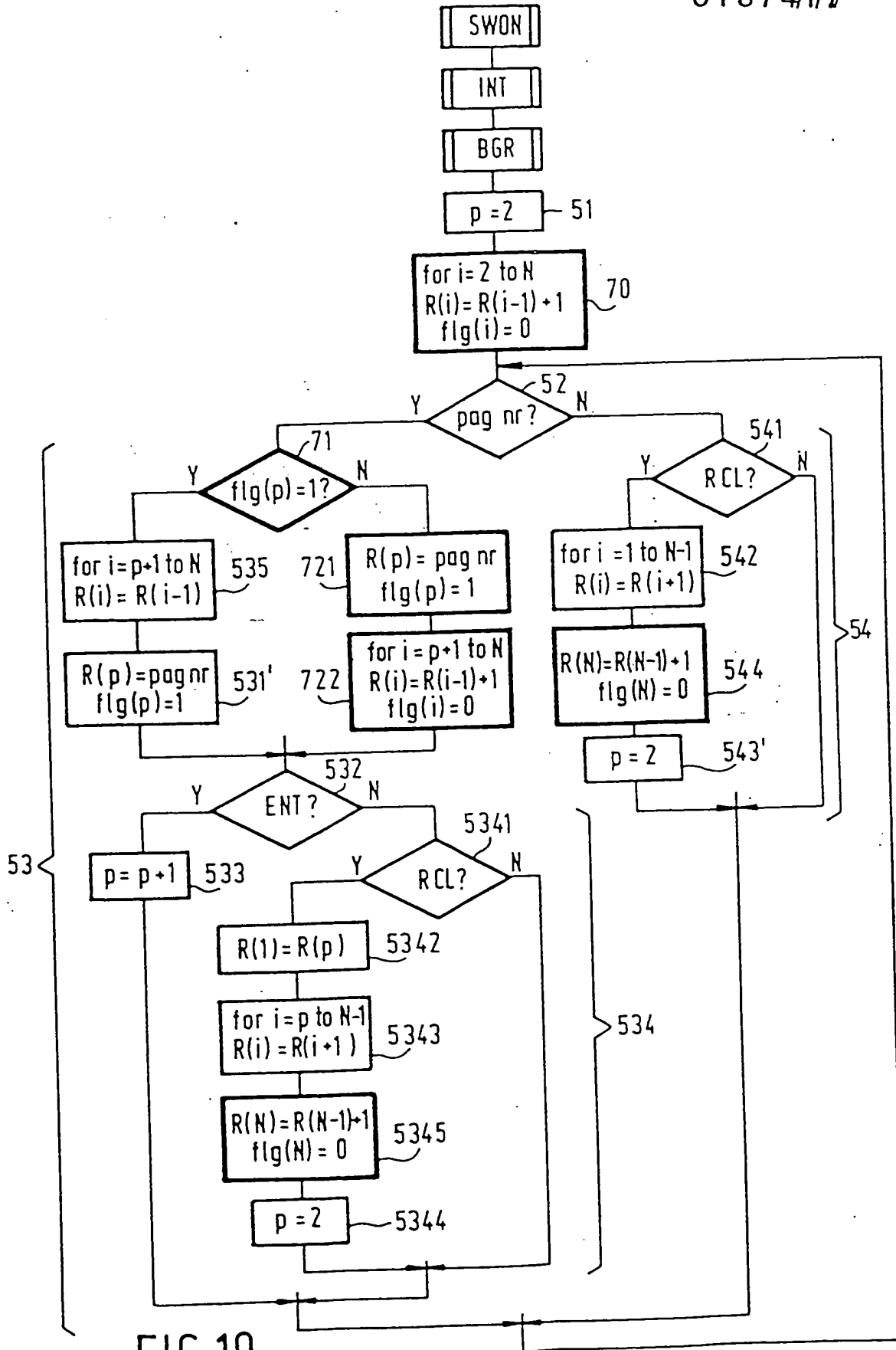
FIG.10

European Patent
Office

EUROPEAN SEARCH REPORT

0187417

Application number

EP 85 20 2060

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	PROCEEDINGS OF THE IEE, vol. 126, no. 12, December 1979, pages 1374-1396, Stevenage, Herts., GB; D.J. BEAKHUST et al.: "Teletext and viewdata - a comprehensive component solution" * Page 1381, right-hand column, line 6 - page 1385, right-hand column, line 9 *	1	H 04 N 7/087 H 03 J 9/06

A	GRUNDIG TECHNISCHE INFORMATIONEN, vol. 27, no. 4/5, 1980, pages 171-196, Fürth, DE; P. HEIDER et al.: "Videotext und Bildschirmtext. Zwei neue Kommunikationsmedien. Grundlagen und Realisierung mit GRUNDIG-Geräten" * Page 181, left-hand column, line 32 - page 182, middle-column, line 59 *	1	
	---		**TECHNICAL FIELDS SEARCHED (Int. Cl.4)**
A	EP-A-0 068 422 (INDESIT INDUSTRIA ELETTRO DOMESTICA ITALIANA) * Page 4, lines 1-18; page 9, line 6 - page 10, line 3; page 38, line 1 - page 50, line 23 *	1	H 04 N H 03 J

A	EP-A-0 037 077 (SIEMENS AG) * Page 9, line 9 - page 11, line 22 *	1	
	--- -/-		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	04-04-1986	VERSCHELDEN J.

| | DOCUMENTS CONSIDERED TO BE RELEVANT | | Page 2 |

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US-A-4 337 485 (CHAMBERS) * Column 2, line 60 - column 4, line 48 *	1	

A	PATENTS ABSTRACTS OF JAPAN, vol. 7, no. 115, 19th May 1983, page 76 E 176; & JP - A - 58 34 690 (TOKYO SHIBAURA DENKI K.K.) 01-03-1983 * Abstract *	1	

A	PATENTS ABSTRACTS OF JAPAN, vol. 6, no. 144, 3rd August 1982, page 37 E 122; & JP - A - 57 65 981 (MATSUSHITA DENKI SANGYO K.K.) 21-04-1982 * Abstract *	1	
	---		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	IEEE TRANSACTIONS ON CONSUMER ELECTRONICS, vol. CE-26, no. 3, August 1980, pages 527-552, IEEE, New York, US; J.P. CHAMBERS: "Enhanced UK teletext moves towards still pictures" * Page 527, right-hand column, lines 29-45 *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	04-04-1986	VERSCHELDEN J.